

**REMARKS/ARGUMENTS**

The examiner is thanked for thoroughly reviewing the subject patent application. Applicants wish to point out the major features of their claimed invention, which is a method of fabricating a spin valve giant magnetoresistive (SVGMR) sensor element in which a lattice-matched buffer layer of  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> provides an enhancement of the spin filtering effect which greatly improves the performance of the sensor. The buffer layer is formed to a thickness between approximately 5 and 15 Å (angstroms) between a seed layer and a ferromagnetic free layer and, in an alternative embodiment, a high conductance layer (HCL) may be interposed between the buffer layer and the free layer.

Having thus briefly explained the invention, Applicants would like to address the specific objections of the Patent Examiner in the numerical order in which they have been raised.

**Claim Rejections Under 35 USC 112**

Applicants respectfully request reconsideration of the rejection of claims 1-17 under 35 USC 112 first paragraph for lack of enablement. Claims 1 and 15 have been amended to include the limitation that the  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> buffer layer and the ferromagnetic free layer have the same crystal structure and about the same lattice constants.

Applicants respectfully request reconsideration of the rejection of claims 1-17 on the basis of indefiniteness for failure to particularly point out and distinctly claim the subject matter of the invention. Specifically:

- (I) Claim 1 has been amended to remove the reference "18" as noted by Examiner.
- (II) Claim 4 has been canceled.
- (III) Claim 8 has been amended to make place the choices of materials in proper alternative form.
- (IV) Claim 14 has been canceled.
- (V) Claim 16 has been amended to more clearly describe the invention and the phrase "further includes" no longer appears.
- (VI) Claims 1 and 15 have been amended to remove the phrase "magnetoresistive resistivity sensitivity enhancing".

#### **Claim Rejections Under 35 USC 102(e)**

Applicants respectfully request the reconsideration of the rejection of claims 1, 8 and 10-13, (claims 7 and 14 being canceled herein) as being anticipated by Kamiguchi (US Patent No. 6,303,218). Although Kamiguchi describes a spin valve giant magnetoresistive sensor with an "electron reflecting layer," he does not describe the  $\alpha\text{-Fe}_2\text{O}_3$  structure buffer layer, formed on a seed layer and having the same crystal structure and about the same lattice constants as the ferromagnetic free layer, of the present claimed invention. Indeed, the material of the electron reflecting layer described by Kamiguchi does not include  $\alpha\text{-Fe}_2\text{O}_3$  and the layer can have a wide range of structures and "need not have stoichiometrically accurate composition...need not form a well-ordered crystal lattice...may include pinholes..." (column 26, lines 28-45 of Kamiguchi). Applicants respectfully argue that the significantly improved performance of

their invention as claimed in claim 1 requires the identical crystal structure and lattice matching of the  $\alpha\text{-Fe}_2\text{O}_3$  structure layer to the free layer.

### **Claim Rejections Under 35 USC 103**

Applicants respectfully request reconsideration of the rejection of claims 1-3, 6 and 8, 10-13 and 15-17 (claims 4,5, 9 and 14 being canceled herein) as being obvious over Horng et al. (US Patent No. 6,292,336). Claim 1 of the present claimed invention teaches the use of an  $\alpha\text{-Fe}_2\text{O}_3$  buffer layer lattice matched to a ferromagnetic free layer of a SVGMR sensor to obtain improved sensor performance. Claim 15 of the present claimed invention teaches the use of an  $\alpha\text{-Fe}_2\text{O}_3$  buffer layer lattice matched to a ferromagnetic free layer and a high conductance layer (HCL) interposed between the buffer layer and free layer to obtain improved SVGMR sensor performance. Horng teaches a NiO layer formed between a seed layer and a ferromagnetic free layer of a SVGMR sensor, but makes no mention of a lattice-matched formation thereof or of the interposition of an HCL. Applicants respectfully argue that the NiO layer taught by Horng does not suggest the lattice-matched  $\alpha\text{-Fe}_2\text{O}_3$  buffer layer of claim 1 of the present invention nor does it suggest the lattice-matched  $\alpha\text{-Fe}_2\text{O}_3$  buffer layer and HCL layer of claim 15 of the present invention.

Applicants respectfully request reconsideration of the rejection of claims 8 and 10 as being unpatentable over Kamiguchi (claims 4,5, 7 and 9 being canceled herein). Claims 8 and 10 of the present claimed invention limit the material structure and dimensions of the ferromagnetic free layer of the claimed SVGMR of claim 1. Since the

advantageous effect of the crystal and lattice-matched alpha-Fe<sub>2</sub>O<sub>3</sub> buffer layer of the present invention depends on its matching to the crystal lattice of the ferromagnetic free layer, the material structure and dimensions of the free layer as claimed in claims 8 and 10 are needed to adequately describe the invention. Applicants have argued above that their claimed invention is not described by Kamiguchi because Kamiguchi does not describe a ferromagnetic free layer lattice matched to an alpha-Fe<sub>2</sub>O<sub>3</sub> buffer layer and they would therefore argue that Kamiguchi does not suggest forming the ferromagnetic free layer in claims 8 and 10, since the rationale for forming that layer in the present claimed invention is that it is the layer that will be properly lattice-matched to the claimed buffer layer. In short, if it is accepted by the Examiner that Kamiguchi does not suggest the alpha-Fe<sub>2</sub>O<sub>3</sub> buffer layer, then it should be equally correct to argue that Kamiguchi does not suggest the ferromagnetic free layer that is matched to the buffer layer.

Regarding the prior art made of record and not relied upon but considered pertinent, Applicants agree with Examiner that this art does not disclose or suggest the present claimed invention.

**Conclusion**

The Examiner is thanked for thoroughly reviewing the application. All claims discussed above are now believed to be allowable. If the Examiner has any questions regarding the above application, please call the undersigned attorney at 845-452-5863

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'SBA', is written above the printed name.

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